

**Abstract**

Rare earth compositions comprising nanoparticles are described along with various nanotechnology applications of such nanoparticles. The compositions of the nanomaterials discussed may include scandium (Sc), yttrium (Y), lanthanum(La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium(Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), and lutetium (Lu).